

REMARKS

Claims 1-10 and 12-23 are pending in the present application.

The rejections of:

- (a) Claims 1-6 and 9-13 under 35 U.S.C. §103(a) over Farrissey et al in view of Joern et al;
- (b) Claims 1-10, 12, and 13 under 35 U.S.C. §103(a) over Kohlstruck et al (US 2003/0187178) in view of Joern et al, and
- (c) Claims 14-25 under 35 U.S.C. §103(a) over Kohlstruck et al (US 2003/0187178) in view of Joern et al and Kohlstruck et al (US 6,093,817)

are respectfully traversed.

In the Office Action, the Examiner again openly recognizes that neither Farrissey et al nor Kohlstruck et al disclose or suggest “the presence of at least one trimerization catalyst selected from the group consisting essentially of the ammonium salts, substituted by four hydrocarbon radicals, of α -hydroxy-carboxylates” according to Claim 1 of the present invention. However, the Examiner contends that Joern compensates for this deficiency by disclosing an alleged equivalence between α -hydroxy-carboxylates and non- α -hydroxy-carboxylates (e.g., acetic acid which is disclosed by Farrissey et al and Kohlstruck et al) as trimerization catalysts. As such, the Examiner alleges that it would have been obvious to replace the trimerization catalysts used in Farrissey et al and Kohlstruck et al with an α -hydroxy-carboxylate to provide “a process for preparing isocyanurate-containing polyisocyanates by at least partly trimerizing (cyclo)aliphatic diisocyanates, which comprises carrying out the reaction in the presence of at least one trimerization catalyst selected from

the group consisting essentially of the ammonium salts, substituted by four hydrocarbon radicals, of α -hydroxy-carboxylates.”

The Examiner also now cites a second Kohlstruck reference (US 6,093,817); however, this reference offers nothing further beyond that of the previously cited Kohlstruck reference. As such, Kohlstruck et al (US 6,093,817) also fails to disclose or suggest “the presence of at least one trimerization catalyst selected from the group consisting essentially of the ammonium salts, substituted by four hydrocarbon radicals, of α -hydroxy-carboxylates” as required by Claim 14. Again, the Examiner’s contention is that Joern compensates for this deficiency by disclosing an alleged equivalence between α -hydroxy-carboxylates and non- α -hydroxy-carboxylates and, thus, the claimed invention would be obvious.

Applicants disagree and submit that the Examiner’s interpretation of Joern is incorrect. Even if the artisan were to follow the argument that Joern discloses the combination of certain carboxylic acids (paragraphs [0009] and [0012]) with trimerization catalysts (paragraph [0013]), the catalysts disclosed by Joern are “tertiary amines, triazines, and, most preferably, metal salt trimerisation catalysts.” In other words, even if the skilled artisan were to select the tertiary amines from the list of trimerization catalysts and the alpha-hydroxy carboxylic acids from the list of carboxylic acids, the skilled artisan would not arrive at the claimed invention.

To this end, it should be noted that a tertiary amine and a carboxylic acid yields a *tertiary* ammonium salt of a carboxylate. However, it is an object of the present invention to use *quaternary* ammonium salts, namely “ammonium salts, substituted by four hydrocarbon radicals.” The difference between a tertiary and a quaternary ammonium salt is that the latter are more thermally stable than the former. Thus, on heating a tertiary ammonium salt decomposes into tertiary amines and carboxylic acids, whereas a quaternary ammonium salt

remains as it was. Thus, the Examiner's allegations are incorrect and a skilled artisan would not simply need to transfer the catalyst from Joern into the process of the Kohlstruck references.

Indeed, the situation is much more difficult. Specifically, the skilled artisan would have to use the carboxylic acid disclosed by Joern – but not every carboxylic acid, but only the alpha-hydroxy carboxylic acids – and combine them with the cationic moiety of the catalysts disclosed by Kohlstruck – but not every cationic moiety, only those substituted by four hydrocarbon radicals. Each of these selections would need to be done without any guidance and/or suggestion of why such a selection can and should be made, or what the result in the selection would be. The selection is further complicated by the fact that Kohlstruck does not only disclose quaternary, but also tertiary, ammonium salts (R^4 can be hydrogen, alkyl, cycloalkyl or alkoxy).

Accordingly, contrary to the Examiner's allegations, there is simply no basis in the cited art to select the specific carboxylic acids of the present invention and specific quaternary ammonium salts of the present invention absent Applicants disclosure to serve as the guidepost. Further, as supported by the data in the specification, there is even less of a reasonable expectation created by the cited art of any level of success in combining their disclosures.

Indeed, Applicants maintain that data in the specification clearly illustrates that inclusion of an α -hydroxy carboxylate provides for significant differences in the NCO values and the color number of the product obtained. These results are germane to the cited art for the reasons given above. Specifically, the cited art does not reasonably provide any basis for arriving at the claimed invention or any expectation of the benefits flowing therefrom.

Accordingly, the data in the specification which shows the importance of the inclusion of an

α -hydroxy carboxylate speaks volumes as to the criticality of the method of the claimed invention.

Specifically, Applicants direct the Examiner's attention to the Examples of the present application, which clearly demonstrate that the α -hydroxyl carboxylic acids give rise to polyisocyanates with a lower color number. Specific reference is made to the following comparisons:

Example 1 (color number of 30 Hz) vs. Comparative Example 1 (color number of 53 Hz)

Example 4 (color number of 17 Hz) vs. Comparative Example 2 (color number of 61 Hz)

Example 5 (color number of 180 Hz) vs. Comparative Example 3 (color number of 800 Hz)

Applicants submit that the results demonstrated in these comparisons clearly illustrate that, even if a *prima facie* case of obviousness can be established, Applicants demonstration is sufficient to rebut the same.

To further explain the relevance and importance of the foregoing comparison based on the data in the specification, Applicants submit the following additional remarks together with the following table specifically reporting the data from the examples of the present application.

	Catalyst	NCO-Value [%]	Color Number [Hz]
Halogen-free hexamethylene diisocyanate (HDI)			
Comp. Ex. 1	N-(2-hydroxypropyl)-N,N,N-trimethylammonium 2-ethylhexanoate	20.9	53
Ex. 1	carboxylate of tetramethylammonium hydroxide with 2-hydroxypropionic acid	19.0	30
Ex. 2	carboxylate of tetramethylammonium hydroxide with 2-ethyl-2-hydroxybutyric	21.2	21

	acid		
Ex. 3	carboxylate of tetramethylammonium hydroxide with 2-hydroxyisocaproic acid	20.7	30
HDI from phosgene process			
Ex. 4	carboxylate of tetramethylammonium hydroxide with 2-ethyl-2-hydroxybutyric acid	21.2	17
Comp. Ex. 2	N-(2-hydroxypropyl)-N,N,N-trimethylammonium 2-ethylhexanoate	21.5	61
Isophorone Diisocyanate			
Comp. Ex. 3	N-(2-hydroxypropyl)-N,N,N-trimethylammonium 2-ethylhexanoate	17.2	800
Ex. 5	carboxylate of tetramethylammonium hydroxide with 2-ethyl-2-hydroxybutyric acid	17.1	180
Ex. 6	carboxylate of tetramethylammonium hydroxide with 2-hydroxypropionic acid	17.3	92

These data show that the color number is not affected by the NCO-value, see for example Examples 2 and 3 with higher and lower NCO-values than Comparative Example 1. The same is true for Examples 5 and 6 as compared to Comparative Example 3. The small differences in the NCO-values do not explain the differences in color number. In other words, the reason for the differences in the color number is not the NCO-value but the catalyst used in the examples.

Further, it is very difficult to exactly reproduce the NCO-values from one example to the other. As is evident the monomeric isocyanate is reacted in the presence of a catalyst to a certain NCO-value, depending on the yield, to obtain a reaction mixture comprising unreacted monomeric isocyanate and the reaction product. Accordingly, from the NCO-value of the reaction mixture the NCO-value of the product cannot necessarily be predicted.

Afterwards, the monomeric isocyanate is essentially distilled off, however, varying small amounts of the monomeric isocyanate remain in the product depending on the exact distillation conditions. This explains why the NCO-value can hardly be met even if you reproduce an example literally.

Looking at the comparison of comparative examples 1 and 2 to Examples 2 and 4, it can be seen that comparative examples 1 and 2 use the same catalyst by HDI of different origin. Using a chlorine-containing HDI instead of a chlorine-free HDI yields a product which is slightly more colored. In contrast, using a catalyst according to the present invention and changing the isocyanate in the same way leads to a slightly less colored product of Example 4 compared to Example 2. This means that the catalysts according to the present invention are even more preferred in a process reacting a chlorine-containing HDI.

Again, Applicants submit that the data is germane to the cited art for the reasons that follow.

Looking at the disclosure of Joern et al, at paragraph [0027], lactic acid is known to act a blowing agent. However, in the manufacturing of polyisocyanates such a feature is not an advantage, but a disadvantage. Specifically, since the pure polyisocyanates are to be obtained rather than foams, the blowing agent feature is disadvantageous. Thus, based upon the disclosure of Joern et al the skilled artisan would not take into account lactic acid as part of a catalyst.

Looking at Kohlstruk et al, catalysts bearing a hydroxyl group are compared with catalysts not bearing a hydroxyl group. However, the hydroxyl group is part of the ammonium cation and not of the counterion, as in the present invention.

According to Kohlstruk et al, a catalyst bearing a hydroxyl group in the ammonium moiety (N-(2-hydroxypropyl)-N,N,N-trimethylammonium 2-ethylhexanoate (C-cat. 1), col. 9, lines

6-25) yield a product with a much higher color number than a catalyst with the same anion but not bearing a hydroxyl group (N,N-dimethyl-N-ethyl-N-(4-methoxybenzyl)ammonium 2-ethylhexanoate (cat. 4), col. 8, lines 43 et seq. and col. 9, lines 37-38). Accordingly, based on the disclosure of Kohlstruk et al, the skilled artisan would be led to the conclusion that adding hydroxyl groups to a catalyst is detrimental with respect to color number.

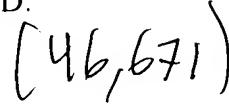
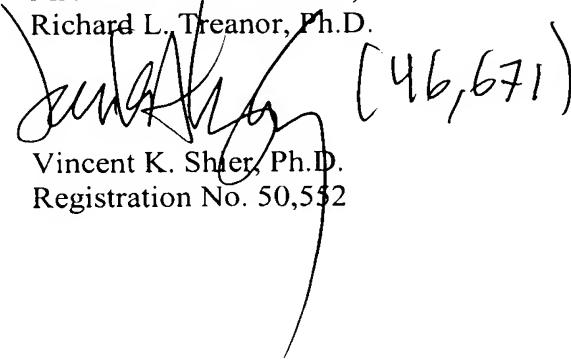
In view of the foregoing, Applicants submit that the obviousness rejections are not sustainable and withdrawal of these grounds of rejection is requested.

Applicants submit that the present application is now in condition for allowance. Early notification of such action is earnestly solicited.

Respectfully submitted,

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